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ABSTRACT

Current efforts to improve literacy teaching and learning are directed at replacing task-oriented approaches to teaching isolated skills with an integrated language arts curriculum, focusing on the cognitive and social processes the learner engages in to write. This new approach requires fundamental changes in the classroom, and computer-based technologies are an important part of the change. In the first place, they can serve as composition tools. Word processors support students in many writing tasks, and the more complex multimedia composing tools provide a rich context for writing and other expression. Computer-based resource tools include multimedia databases and online educational services to enhance the writer's reach. Communication tools include electronic mail, real-time conferencing, discussion forums, and bulletin boards. Technology can be a powerful tool for teachers and schools that are committed to an integrated language approach. Accompanying discussions examine student note-taking from computer-based materials and the use of computers in adult literacy programs. (Contains 4 references.) (SLD)

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Literacy and Technology

Literacy is one of the goals on the forefront of current school reform efforts. Changes in the economy, society, and family require adjustments both in the kind of literacy competence that we expect from learners, and in how we teach. Developments in technology contribute to our changing notions about what literacy is by changing the media and formats in which we communicate. Just as the invention of the Greek alphabet and the printing press have in the past created new demands for literacy, so has the more recent proliferation of electronic media, such as computers and telecommunications, which have inundated us with vast amounts of information and new ways of encountering and manipulating it. Two hundred years ago, a person who could write his or her own name was considered to be literate (Kirsch & Jungeblut, 1986). Today, a person is considered to function at a high literacy level if he or she has the ability to read and write, and to apply the thinking skills needed to process information and communicate effectively (e.g., Kirsch & Jungeblut, 1986; U.S. Department of Education, 1990).

by Babette Moeller

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Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.

Definition of Literacy that formed the basis of the 1985 NAEP Young Adult Literacy Assessment

Every adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship.

Goal 5 of the National Education Goals established by the nation's Governors and President for the year 2000

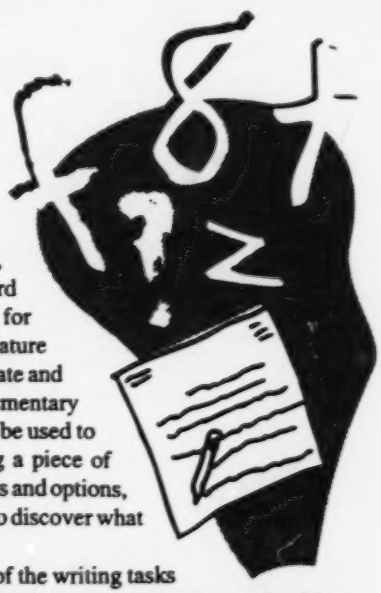
Literacy is an important goal both for society and for the individual. It is essential to the nation's economic competitiveness, and to people's participation in the political process, as recognized in the National Educational Goals for the year 2000 established by the Governors and the President. But literacy is also the key to lifelong learning. It influences how we communicate and learn, how we pass on cultural knowledge, and how we function in the workplace, the community, and the family.

Current efforts to improve literacy teaching and learning are directed at replacing task-oriented approaches to teaching isolated skills with an integrated language arts curriculum, in which language is used as a tool for inquiry-based learning. In the past, language arts have often been taught as separate subjects (reading, spelling, grammar, composition), with an instructional focus on gaining language proficiency. By contrast, the new language arts curriculum that school reformers envision, involves students using language in subject matter areas to build and communicate meaning as they work collaboratively with other students on engaging projects. Students learn to read and write, to communicate, and to make meaning by doing it. The new approach is thus focussed on the cognitive and social processes that the learner engages in to write a composition, to give a presentation, to participate in a discussion, or to comprehend text.

The new approach towards literacy teaching and learning requires fundamental changes in the classroom. Both the students' and the teachers' roles need to change. Rather than being the passive recipients of instruction, students need to be responsible for their own learning and actively pursue topics of interest to them. Teachers and schools need to provide learning environments that are supportive of individual students' interests and rich in resources. In schools, students need ready access to books and other reading materials, writing tools and materials, computers, and visual media such as video and interactive videodisks, as well as spaces where they can meet and discuss their work, and workshops where they can produce newsletters, and audio and video messages for others. In such classrooms, the teacher's role changes from that of an instructor, to that of a facilitator who creates the communication environment in which meaning making can happen through conversation and discussion, and reading and writing. In this new role, the teacher helps students to pose questions, to work with others, and to find resources and materials.

Computer-based technologies are an important part of this change. Following are some examples of how different kinds of computer technologies can support and enhance literacy activities, such as composing, finding resources, and communicating, that are an integral part of the inquiry process.

Composition Tools



Word Processors

As has been recognized for a long time, word processors are very powerful tools for writing. They enable the user to enter text that can be easily moved and changed without having to rewrite it, and to print out professional looking writing. Word processors usually include a variety of options for manipulating and editing text. Most programs feature spell checkers and thesauri that help the user to locate and correct spelling errors, and replace words. Supplementary programs such as grammar and style checkers can be used to broaden the options for analyzing and correcting a piece of writing. Some word processors also include formats and options, such as outlines and prompts, which help the user to discover what they want to say and organize their thoughts.

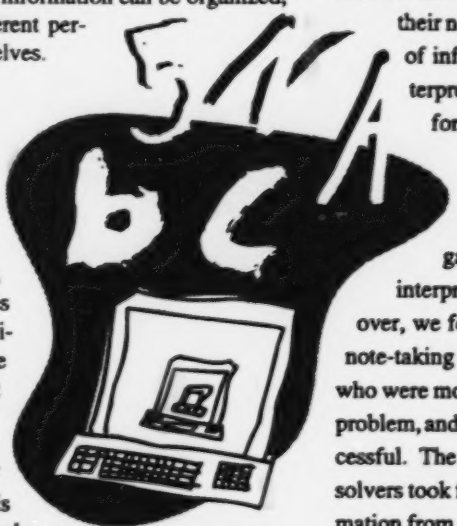
Word processors can support students in many of the writing tasks that are part of the inquiry process, such as keeping a journal, taking notes, and writing a report. They not only offer students a quicker and more efficient means for accomplishing

different aspects of a writing task such as editing, revising, and producing multiple drafts of a composition, they also highlight the components of the writing process (planning, idea generation, editing, revision). Moreover, the visibility of writing on a word processor, and the availability of printed copies of drafts can readily promote social interaction around writing tasks. Word processors thus scaffold the process approach to writing, which places emphasis on choosing meaningful topics, writing in groups, producing multiple drafts, and conferring about drafts.

Multimedia Composing Tools

Multimedia composing tools are more complex. This technology allows users to combine print with audio (sounds, music, voice), graphics (slides, video clips, drawings, animations), and even other computer programs (such as simulations, games, or microworlds). These different media and the links between them can be represented in a conceptual web, rather than just linearly as in traditional text. Each piece of information can be cross-referenced with other pieces of information.

Multimedia composing tools supply a rich context for writing activities, and allow students to experience authorship in a variety of different forms. Nontextual media, such as images or videos, can serve as prompts for generating text, by building and eliciting students' ideas about what to write about. They can also help students to express aspects of experience such as emotions or scenes that can be difficult to put into words. Moreover, the flexibility with which text can be organized encourages many different organizations of writing and the creation of new genres. Because of the possibilities of combining text and non-textual materials, and the flexibility with which information can be organized, multimedia composition tools allow students with different perspectives, interests, and learning styles to express themselves.



Resource Tools

Multimedia Databases

Multimedia databases provide users with information in a variety of media (text, audio, graphics) that are multidimensionally interconnected. The user can browse, read, and view materials following their own preferences and interests, rather than being limited by the linear organization of traditional texts. For instance, in a database on the American Civil War users may read an eyewitness account from a slave who escaped through the underground railroad. In this entry, people and places are mentioned that are dynamically linked to photographs and drawings of these people and places. Each of these images in turn is linked to more text that provides descriptions of these people and places, including audio impressions. The user can follow these dynamic links, exploring new connections, or continue reading through the original material without interruption.

Multimedia databases that are either commercially available, or that were put together by teachers or other students, can serve as rich resources for students' project work. The nontextual materials contained in them provide students with a context to read and interpret text, and help to illustrate information in multiple formats. Moreover, the multidimensional organization of the materials in these databases allows students to follow their own interests and to read materials that spark their curiosity, and it makes information accessible to learners with different perspectives and learning styles.

On-line Educational Services, Databases, Encyclopedias, Publications, and Bulletin Boards

Telecommunication technologies offer users access to vast amounts of resources. Through on-line educational services, databases, encyclopedias, publications, and bulletin boards, users can locate and find textual information on every imaginable topic.

Note-taking in Inquiry

In a recent case study (Moeller, Hawkins, Brunner, & Mazgamen, 1989), we examined students' note-taking strategies in the context of solving a science problem. We asked a group of sixth graders to take notes on a computer from sources in different media (text, video, tables, graphs). We found not only quantitative differences in the way students derived notes from different sources, but also qualitative differences in note taking strategies. Text-based materials elicited a great deal of note-taking from students, but their notes revealed little evidence of information integration or interpretation. The reverse was true for the video and the tables and graphs. While students took relatively few notes on these materials, they engaged in more integrative and interpretative note-taking. Moreover, we found several differences in note-taking strategies between students who were more successful at solving the problem, and students who were less successful. The more successful problem solvers took fewer notes, included information from a greater variety of qualitatively different sources, and their notes reflected more information integration within and across segments of the information sources, as compared to the less successful problem solvers. These results suggest that nontextual sources of information may prompt students to use note taking in a more reflective manner, and that reflective note-taking that utilizes multiple information sources will help students to make sense of new information.

Using Technology in Adult Literacy Programs

Electronic technologies can also play an important role in adult literacy programs. In addition to supporting the integrated language arts approach, this technology makes it possible to reach out to new learners in new settings. For instance, captioned telvision programs may enhance adults' reading development at home.

Currently, however, there still exist several obstacles that make it difficult for adult literacy programs to make use of electronic technologies. In a recent survey on the use of computer and video technology in New York City-based adult literacy programs that we conducted for the United Way of New York City Literacy Task Force (Moeller & Hawkins, 1991) we identified several areas of need:

- Many agencies need **resources** (hardware and software). Agencies that have not used computers and video expressed a desire to do so, and agencies that already use these technologies indicated that they would like to extend their use.
- Instructors in adult literacy programs need opportunities for **staff development**. Our results indicate that it is more the exception, rather than the rule, that instructors come to an agency well prepared to use computers and video and to integrate these technologies into their curriculum. To the extent that instructors have knowledge about the use of electronic technologies in the classroom, it has often been self-taught on their own time.
- The teaching staff in adult literacy programs needs **staff support**. We found that the predominant means of support that instructors received in the integration of computers into their curriculum was limited to informal and sporadic help from other instructors.

This technology can increase both the range and the scope of resources that are available in the classroom. Students are able to access information for their projects from far beyond the classroom walls. Because of the diversity of information available from around the world, students can find information that matches their level of reading and their particular interests. Students are thus encouraged to read in the pursuit of their curiosity.

Communication Tools

Electronic Mail, Real-Time Conferencing, Discussion Forums, and Bulletin Boards

Networks that link computers either locally, within a classroom or a building, or long-distance, through modems and telephone lines, are very promising new tools for communication. Through electronic mail, real-time conferencing, discussion forums, and bulletin boards people can send each other messages and have conversations with each other in writing. These technologies not only facilitate communication and collaboration, they also make it possible to dramatically reconfigure traditional instructional settings by extending conversation between people across both distance and time.

In the classroom, these communication technologies make it possible for students to conduct interviews with experts, and to share and discuss their work with a variety of different audiences, including students at other schools, parents, and the community. Moreover, they facilitate the production of collaborative reports, and afford students the flexibility to work on their own time, while remaining in communicative contact with their teachers and fellow students. As part of on-line conversations, students get to practice a broad range of reading, writing, and communication skills in meaningful contexts. On-line written conversations with different people may also help students to become more aware of the requirements of different audiences.

Summary

Computer-based technologies thus can play an important role in supporting and sustaining change in literacy teaching and learning. While it is unlikely that the technology by itself will bring about change in the classroom, it can serve as a powerful tool for those teachers, and those schools, that are committed to an integrated language arts approach. For teachers, the use of word processors, electronic networks, telecommunications, and multimedia technologies in the classroom can help to organize student activity and to scaffold the cognitive and social processes involved in students' literacy practice. And for students, these technologies represent powerful tools for composition, communication, and for gaining access to vast amounts of information.

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